

CLAIMS

1. A multiple electrode for measuring electro-physiological characteristics of a biological specimen, comprising:
- 5 a plurality of micro-electrodes provided on a first region on a substrate; and
- a reference electrode provided in a second region on the substrate,
- 10 wherein the reference electrode includes at least one stimulus reference electrode for applying an electrical signal to the plurality of micro-electrodes.
2. A multiple electrode according to claim 1, wherein the reference electrode includes at least one measurement reference electrode for detecting an electrical signal from the plurality of micro-electrodes, and the stimulus reference electrode is electrically insulated from the measurement reference electrode.
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3. A multiple electrode according to claim 1 or 2, wherein the second region is placed at a distance from an outer edge of the first region, and surrounds the first region.
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4. A multiple electrode according to any of claims 1 to 3, wherein the biological specimen is placed in such a manner as to overlap with the first region and not to overlap with the second region.
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5. A multiple electrode according to claim 3 or 4, wherein the distance is set to a value such that an electrical signal generated from a micro-electrode receiving an applied electrical signal is detected, and electrical noise

generated from a micro-electrode receiving no applied electrical signal is not detected.

5 6. A multiple electrode according to any of claims 2 to 5,
including a plurality of stimulus reference electrodes and
a plurality of measurement reference electrodes, and the
plurality of stimulus reference electrodes or the plurality
of measurement reference electrodes are substantially
10 symmetrically provided with respect to a center of the first
region.

15 7. A multiple electrode according to any of claims 1 to 6,
wherein the plurality of micro-electrodes are arranged in
a matrix within the first region.

20 8. An integrated cell installer comprising a multiple
electrode according to any of claims 1 to 7, wherein the
integrated cell installer has a cell installing region for
placing a biological specimen on the substrate of the
multiple electrode.

25 9. A cellular potential measuring apparatus comprising: an
integrated cell installer according to claim 8; an output
signal processor connected to the micro-electrodes for
processing an output signal due to an electro-physiological
activity of a biological specimen; and a stimulus signal
provider for optionally providing an electrical stimulus
to the biological specimen.

30 10. A cellular potential measuring system comprising: a
cellular potential measuring apparatus according to
claim 9; and an optical monitoring apparatus for optically
monitoring a biological specimen; and/or a cell culture

apparatus for controlling the culture environment of the biological specimen.

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